Result Page

DESCRIPTION positioning device for workpiece carriers or workpieces the invention relates to a positioning device for workpiece carriers or workpieces, of one more-oh-triumphs manipulator held and guided becomes with the features in the preamble of the principal claim.

In the practice it is known the fact that more-oh-triumphs manipulators especially more-oh-triumphs industrial robot, workpiece carrier or gripping means hold and lead also or for several workpieces. The positioning accuracy depends on the course accuracy and the stiffness of the robot.

Furthermore from the practice rotary tables are known as positioning devices for workpieces. The workpieces must become here re-clamped and on the rotary table positioned. They can become then by a machining apparatus machined. To completion of the process the workpieces must be again re-clamped and carried on. In place of rotary tables also rotary drums or Drehwändepositionierer become inserted. In addition these apparatuses is the drawback to own that they offer no optimum process situation of and orientation because of their limited kinetics also for the workpieces.

It is object of the current invention to point a possibility out to the better and more exact positioning of workpiece carriers or workpieces which of one more-oh-triumph manipulator held and guided become.

The invention solves this object with the features in the principal claim.

The positioning device according to invention offers a substantial improvement of the positioning accuracy. The manipulator supports the workpiece carrier or the workpiece at the positioning device off. Besides the positioning device has a receiving device, the one movable support also in or several axis of movement permitted. Thus the manipulator can orient the workpiece carrier or the workpiece in different attitudes, without leaving the support of the positioning device. The workpiece can become thereby in various work on-favourable attitudes brought.

With a welding process the workpiece z can. B. in a tub situation favourable for the weld pool held become at least large. Besides a better accessibility for the associated machining apparatuses results, in particular for work robots. By the positioning device and the additional workpiece support the manipulator or positioning robot can become high loaded and to to the safety limit loaded controlled also targeted in certain regions and. Besides it is possible that in a chained Zellensystem a presentation of the workpiece and/or workpiece carrier can happen into the subsequent cells. The positioning device according to invention can be begun in connection with most different workpiece treatment processes and processing means. Here also advantages for the quality assurance result.

Is from particular advantage one more-oh-triumphs orientation over a centering admission formed as prism or cone. This offers an orientation possibility in three pivotal axes. By additional translational axes of movement can also one six-oh-triumphs Orientierungs-und positioning possibility provided to become. This offers particular advantages with the observance the optimum construction unit situation also with curved paths by synchronous methods of the manipulator and the work robot.

If the workpiece at a workpiece carrier is tensioned and becomes with this positioned, also workpiece transport can become realized over the workpiece carrier. Re-clamping work can be void. The automation flexibility rises. Maintenance works at the workpiece carrier can happen off-lines, whereby the plant availability rises. Furthermore is a temporal decoupling manual Einlegevorgangs of the machining operation of the possible. With use of different workpiece carriers is besides type-mixes without larger effort possible. Here the workpiece carriers become over standardized tool tools anbzw. disconnected.

The invention possible it furthermore to reduce the processing steps and thus the number of the too continuous processing stations. By the better orientation possibility of manipulator and work robot can be settled a larger number of processing steps with same tool geometry. This is to be due among other things to the better accessibility of the workpiece. Here it is favourable in particular, if the workpiece carrier becomes calm by the manipulator and the positioning device supported at two and each other opposite locations lying apart far and. The better accessibility and the higher process accuracy connected thereby benefit also a higher quality of dimensional stability of the workpieces. Finally also a quality assurance leaves itself by geometric Scan the workpiece carrier with tensioned workpiece in a separate measurement position and by subsequent scanning of the workpiece for Werkstückträgerdes and/or a scanning of the workpiece carrier without workpiece reaching.

Other advantageous embodiments result from the Unteransprüchen.

The invention is in the designs for example and schematically shown. In detail show: Fig 1: a manipulator with one Workpiece carrier, a workpiece and one
Positioning device in a schematic side view and a fig 2: a plan view on an arrangement in accordance with Fig 1 in connection with one

Machining apparatus, in particular a work robot.

Fig 1 shows a schematic processing station (17), for example a working on cell, the component of an arrangement from several stations or cells to be can. In the station or cell (17) a manipulator (2) is at least, which a workpiece carrier (6) with an position-accurate stretched workpiece (8) holds and leads. Besides the included station or cell (17) a positioning device (1), at which the manipulator (2) supports the workpiece carrier (6) during the machining operation. Besides itself several machining apparatuses (5) can, for example more-oh-triumph work robots, find in the station or cell or, which work on workpiece held and the led (8) in arbitrary suitable way also or several tools (16).

In the illustrated embodiment more-oh-triumphs manipulator (2) is the formed as heavy load positioning robots with six or more axes. The manipulator or positioning robot (2) has an hand (3) in a flanged on change device (4), by means of those it the workpiece carrier (6) keeps more releasable. The workpiece carrier (6) possesses at least a terminal (7) to the connection with the change device (4) and/or the manipulator or positioning robot (2). The terminal (7) is preferably edge-laterally arranged at the workpiece carrier (6). Thereby the workpiece carrier (6) of the manipulator or positioning robot (2) becomes essentially flying held and guided.

The positioning device (1) consists of at least a receiving device (9), at which the manipulator (2) can support the workpiece carrier (6) in or for several axes (15) a movable. In fig 1 are for example two receiving devices (9) in different positions and alignments arranged. Their number can be also larger. In the same way also their alignment can vary.

The single receiving devices (9) possess one centering admission (11) at least in each case, those in or the more oh victory movable support possible. In the illustrated embodiment the centering photographs (11) are as prism or formed as cone.

The single receiving devices (9) furthermore possess a frame (10), are arranged at which in each case in or several centering photographs (11). The frames (10) are in the illustrated embodiment stationary and corridor-bound arranged. They can in particular be more movable alternative also movable and in or several translational axes. The centering photographs (11) are preferably rigid fixed at the frames (10). In addition, they can be for their part in or several axes a movable at the frames (10) positioned.

At the workpiece carrier (6) several suitable approaches (14) are in or several support members (13) arranged over in or, which are preferably formed as spheres (13) or ball parts. They cooperate with the centering photographs (11) and permit a support with in or more oh winners positioning barness or orienting barness. The spheres (13) are in the illustrated embodiment formed as ball heads, which are larger as an hemisphere. Alternative ones can be it also as hemisphere sections or still smaller ball sections formed. In an other modification it can itself also around differently constituted spherical or rounded off parts, z. B. also around oval bodies, act. An array of spheres (13) possible it to support the workpiece carrier (6) in different attitudes and at different receiving devices (9).

▲ top

At the centering photographs (11) or several sensor (12) can be an arranged, which takes up the forces and/or paths or other physical values with contact between the sphere (13) and centering admission (11).

The sensors (12) are arranged in addition in arbitrary suitable way formed and at suitable locations, z. B. within the contact zone of the centering admission (11) or at the junction between centering admission (11) and frame (10).

Over the sensors (12) z can. B. the lining up force or the path measured becomes. With a suitable array of sensor (12) or it can a three-dimensional strength or way sensor be determined with the fact whether the sphere (13) is exact in the centering admission (11) positioned. Thereby also the pressing force and positioning accuracy of the manipulator (2) can be readjusted found and corresponding. Is z. B. the lining up axial force to large, moved itself the manipulator (2) so far back, until the forces balanced are and/or their target value achieved have. Reverse one must adjust the workpiece carrier (6) with one to small force the manipulator (2) and press strong the aegen centering admission (11). Over this power measurement can besides found become whether if necessary the manipulator (2) becomes overloaded. Furthermore it can be determined by a suitable sensor assembly (12) whether the pressing direction of the manipulator (2) is correct. Over the sensor assembly (12) can besides with an appropriate control and a suitable programme the Tool center POINT (TCP) of the sphere position during the process in or repeatedly determined and/or corrected become.

By the more oh victory the manipulator (2) can movable receiving devices (9) the workpiece carrier (6) in different attitudes orient and opposite the machining apparatus (5) in suitable way align. Here also a basic reorientation can take place by means of changes of the receiving device (9).

The terminals (7) and the spheres (13) are preferably arranged at the edges of the workpiece carrier (6) and at locations lying apart far. In the embodiment of fig 1 and 2 preferably is them at each other opposite locations.

Thereby the workpiece (8) for the machining apparatus (5) and the tools (16) is free accessible. Fig 2 shows this.

With the treatment process the moved manipulator (2) the workpiece carrier and the workpiece (8) in different application-dependent and process-favourable attitudes and orientations. Here z can. B. the workpiece (8) when welding so guided it becomes that the weld pool is at least to a large extent in a tub situation. Besides the manipulator (2) and the machining apparatus (5) can move synchronous, in order to keep the optimum process situation also with curved working on courses. For this is suitable Zellen-bzw. Robotic control (not shown) present.

The machining operations and the machining apparatuses (5) can be in the various stations or cells (17) from different and arbitrary type and formation. For example it concerns welding, Klebeoder of coating processes. Besides the machining apparatus (5) can be as mechanical or optical measuring device formed, which scans the workpiece carrier (6) with the tensioned workpiece (8) in a measuring station by a measuring tool (16). Besides still the workpiece (8) is then measured after opening the Spannstellen of the workpiece carrier (6). In a third step then still the workpiece carrier (6) without workpiece (8) can be measured. By comparison of the measurement results delay or other changes of geometry can be determined and to be supervised Bearbeitungs-und process quality as well as

the construction unit quality.

The manipulator (2) can pass the workpiece carrier on (6) over the change device (4) also to the next station or cell. There a corresponding manipulator couples to a second terminal (7), takes over the workpiece carrier (6) and supplies it to an other treatment process, whereby again a positioning device (1) can come to the use.

Modifications of the illustrated embodiment are in many way possible. To the one the workpiece carrier (6) can be void. In this case the workpiece (8) has even suitable terminals (7) and spheres (13). The handling is then the same as with the workpiece carrier (6).

In an other variant the receiving device (9) with the frame (10) and the centering admission (11) can be different formed. For example a simple tubing admission present can be, those only a rotational movement around the longitudinal axis permitted. In this case the sphere (13) becomes replaced by a cone or a cylindrical pin. In this case can the workpiece carrier (6) or the workpiece (8) only around axis of movement (15) a twisted become. Beyond that also other variants of the formation and orientation possibilities are possible.

The manipulator (2) is in the illustrated embodiment formed as heavy load robots. It can consist also in suitable other manner of or several moving units.

REFERENCE SYMBOL LIST 1 positioning device 2 manipulator, positioning robot 3 hand 4 change device 5 machining apparatus, work robot of 6 workpiece carriers 7Anschluss 8 workpiece 9 receiving device 10 frame 11 centering admission, prism, cone 12 sensor assembly 13 sphere, ball part of 14 approach 15 axis of movement 16 tool 17 processing station, cell